Introduction to the LDAS developed at University of Tokyo

–Auto-calibration System Developed to Assimilate AMSR-E Data into a LSM for Estimating Soil Moisture and the Surface Energy Budget

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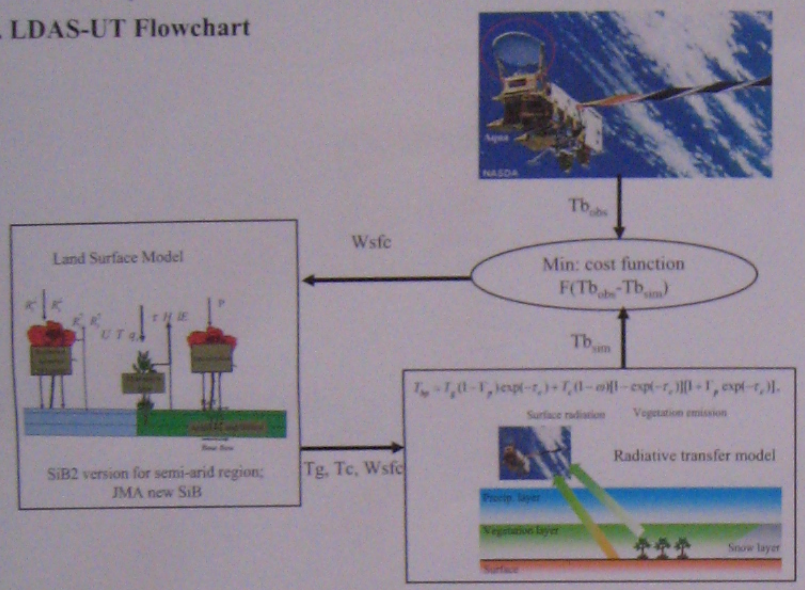
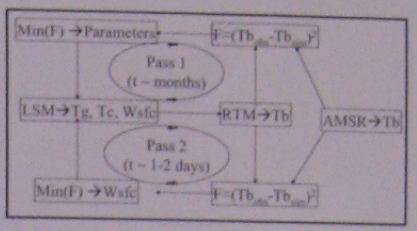
Abstract The land data assimilation system developed at University of Tokyo (LDAS-UT) assimilates AMSR data into land surface model (SiB2, JMA new SiB) through a dual-pass technique. Pass 1 inversely estimates values of model parameters with long-term (~months) forcing data and brightness temperature data, and Pass 2 only estimates the near-surface soil moisture in a daily assimilation cycle. The system is driven with globally available data sets. It was shown that the assimilation system significantly improved state variables and energy partition simulation compared with no-assimilation case.

1. LDAS-UT Flowchart



2. LDAS-UT dual-pass algorithm



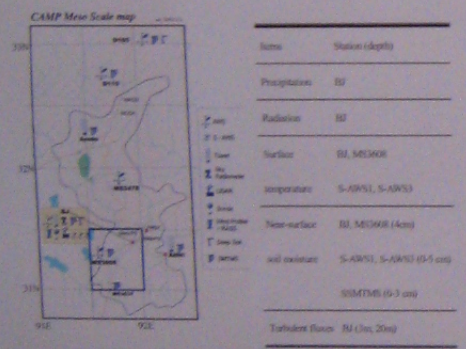
3. Parameters of LDAS-UT

- Surface parameters for RTM
  - roughness, vegetation optical parameters
- Initial soil moisture values for LSM
- Soil texture for RTM and LSM
  - Sand and Clay

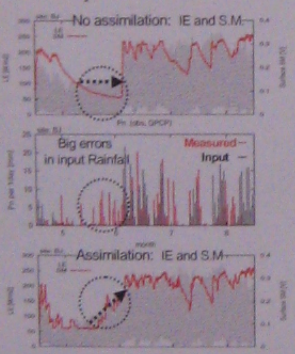
4. Input data (globally available)

- LDAS-UT grid size: 0.5 degree
- Forcing
  - –GPCP precipitation: 1 degree
  - –ISCCP radiation: 2.5 degree
  - –NCEP reanalysis: 1.5 degree
- Leaf area index: MODIS
- Microwave Tb: AMSR-E

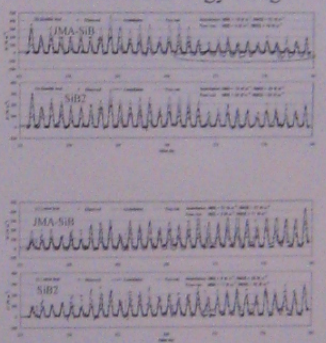
5. Validation at CEOP-Tibet reference site



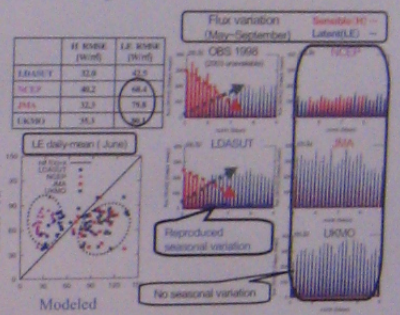
5.1 Impacts of rainfall errors



5.2 Surface Energy budget

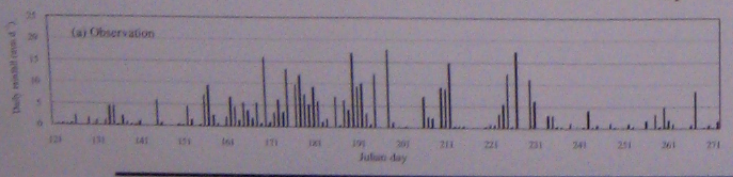


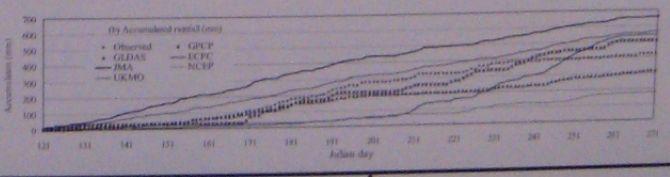
5.3 Compare with GCMs

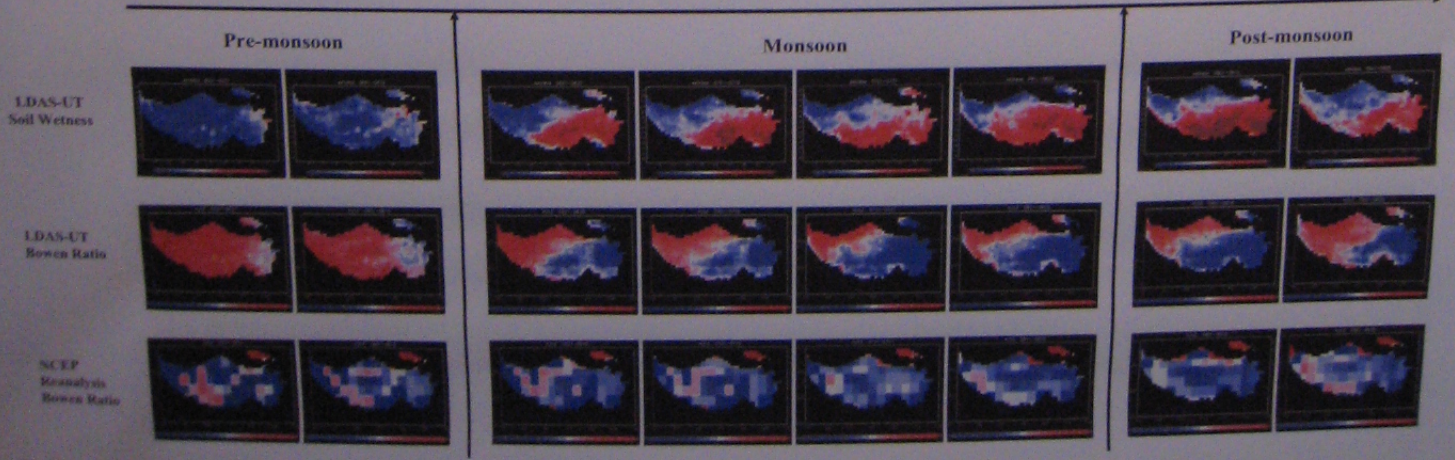


6. Application to the Tibetan Plateau

Precipitation at CEOP East-Tibet reference site







7. Conclusions

- LDAS-UT assimilates AMSR data into two LSMs with a dual-pass technique for parameter tuning and near-surface soil moisture retrieval.
- The system integrates current well-established global products so it can be easily extended to other regions.
- LDAS soil moisture and energy partition is less contaminated by the error of precipitation data than no assimilation case. This result is very encouraging for producing reliable surface energy budget in remote regions such as Tibet, where input precipitation data are prone to severe errors.

Reference